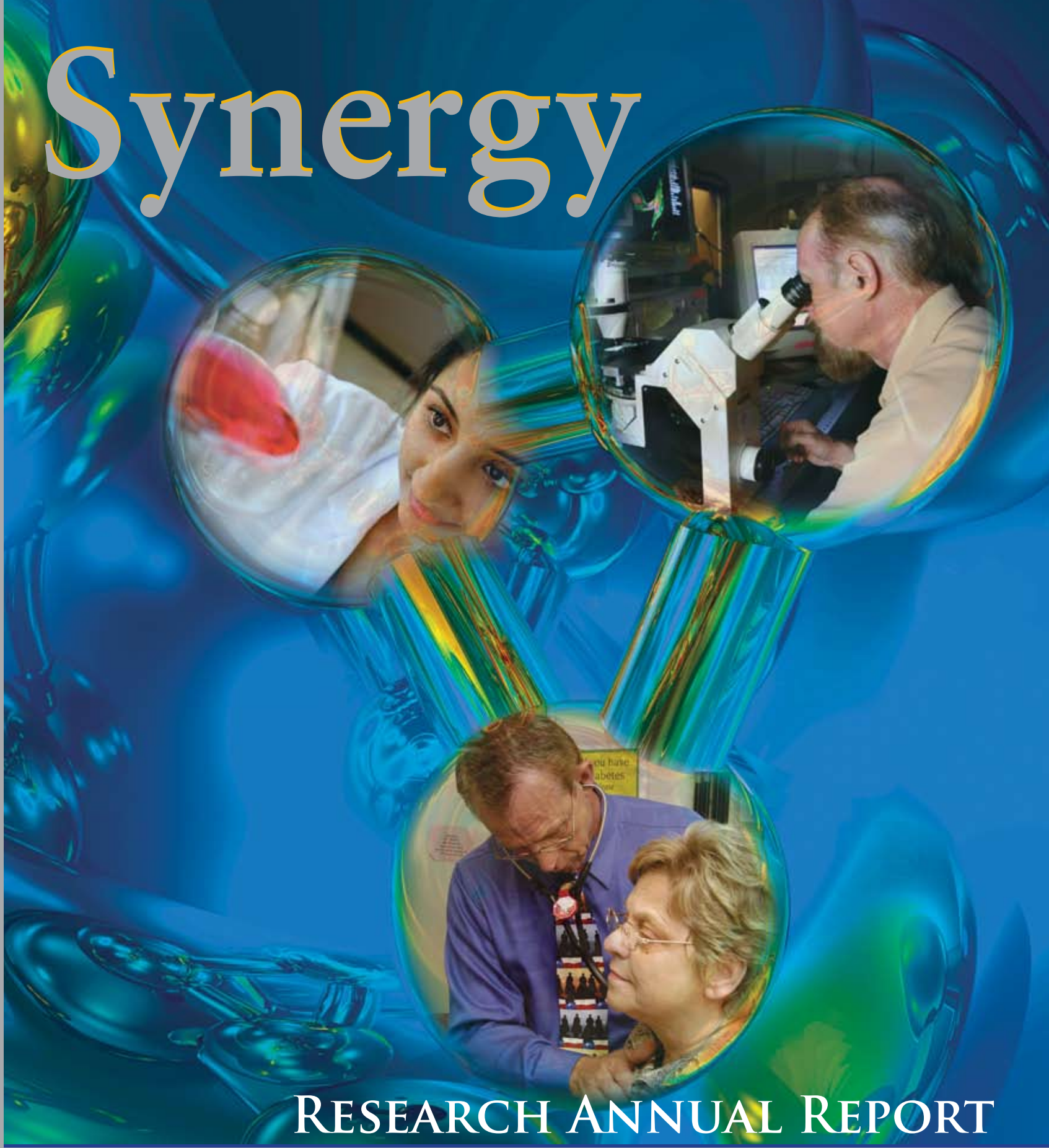
Synergy



Research Annual Report

University of North Texas Health Science Center

Welcome

In 2005, The University of North Texas Health Science Center had more than $23 million in research expenditures. This amount represented an 80 percent growth over the previous four years, leading all Texas health science centers in research growth for the same period. Moreover, UNT Health Science Center had a federal-to-state research expenditure ratio of 73, the highest of any of the health science centers in Texas. This was a reflection of a 77 percent federal funding rate from all our extramural research support, suggesting an excellent leveraging of state dollars. This past year, 2006, we received more than $26 million in extramural research awards, representing more than a 30 percent increase over the previous year.

In this publication, we have focused on some of the highlights of the past year. In particular we have featured some of our new people and technologies. For instance, we have recruited two brothers, Drs. Karol and Ignacy Gryczynski, fluorescent biophysicists who specialize in nanophotonics, to direct our new Center for the Commercialization of Fluorescent Technology. Their research will lead to new biosensors for detecting changes in the environment, as may occur due to bioterrorism, or to monitor changes in health, which can lead to better diagnostic procedures.

Our Welch Professor, Dr. Laszlo Prokai, who joined us two years ago, brought to our organization a first-class proteomics facility. Through funding from the U.S. Department of Defense, he obtained a state-of-the-art hybrid mass spectrometer that is perhaps the most accurate and sensitive on the market and one of only three in the country. With this instrument, he will be able to rapidly and accurately detect not only proteins but other molecules that are important to health and better understanding of disease.

We were also fortunate to recruit Dr. Eric Johnson to our School of Public Health to head the environmental and occupational health and epidemiology departments. Dr. Johnson is a well-funded investigator who examines the effects of environmental toxins on the health of the population. He also is an expert in avian flu and has an interest in better understanding the transfer of diseases from animals to humans.

Joining him in the School of Public Health is Dr. Jeff Talbert, chair of health management and policy, whose major research interest focuses on health policy, outcomes measurement and health informatics. He is in the process of establishing the Center for Medicaid Management and Efficiency.

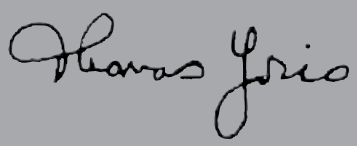
We have also attracted Dr. Harvey Brenner, chair of social and behavioral sciences, who conducts international collaborative research projects on health and quality of work issues.

These new faces, approaches and technologies complement our existing research efforts. For example, the proteomics facility is an integral part of our very successful and internationally recognized Institute for Aging and Alzheimer's Disease Research and Department of Pharmacology and Neuroscience. Led by Dr. James Simpkins, this group of scientists has two National Institutes of Health (NIH) program project grants aimed at determining new approaches for the treatment of Alzheimer's disease. Their efforts have resulted in more than $6 million per year in research funding, and several treatment approaches are now in clinical trials.

The National Osteopathic Research Center, also housed here at UNT Health Science Center, is the osteopathic profession's major center focused on providing evidence for the efficacy of osteopathic manipulative medicine (OMM). Led by Drs. Scott Stoll and Michael Smith, the center has funding from the NIH, the Osteopathic Heritage Foundation and several osteopathic medicine associations. This effort represents an interdisciplinary approach enlisting scientists, public health professionals and clinicians.

Our Texas Center for Health Disparities, funded by an NIH EXPORT (Excellence in Partnerships for Community Outreach and Research on Disparities in Health and Training) grant, promotes research and education in disease and care access inequities. This center complements our School of Public Health's Texas Institute for Hispanic Health.

In summary, our researchers are working hard to secure a better, safer and healthier future for all of us. However, we can't get there without support. If you would like more information about how you can contribute to any of these research areas or would like to set up a visit, please feel free to contact me. The future looks bright, and together we can ensure that it is.



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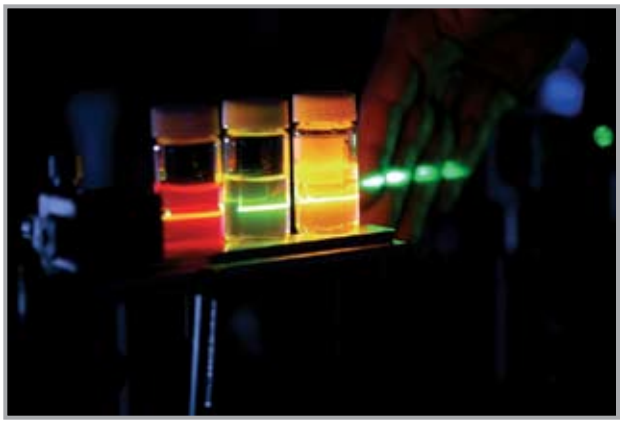
Inside



Welcome to the first annual research report for the University of North Texas Health Science Center. Research is an integral part of the institution's mission, intimately associated with student training and our commitment to the advancement of knowledge. Our researchers are providing insights into new approaches for the treatment of a variety of diseases and moving our discoveries from the bench to the bedside.

Preventing

Alzheimer's

"The research that we do will impact the future of treatment and prevention of Alzheimer's disease – period."

Imagine watching your mother, who has always been generous and kind, suddenly become demanding and selfish. While most people associate Alzheimer's disease with forgetfulness, that is only one of the symptoms families must cope with. Losing your keys is one thing, but not recognizing your children or grandchildren is quite another. Caring for a loved one with Alzheimer's disease is not for the faint of heart.

Alzheimer's disease, which robs people of their short-term memory and ultimately their independence, affects 4.5 million Americans, according to the Alzheimer's Association, and that number is expected to grow.

The toll it takes is not just on those with the disease though. According to the Alzheimer's Association, seven out of 10 people with Alzheimer's live at home, and almost 75 percent of their care is provided by family members and friends. The remainder of their care is provided by health care professionals, and the families pay almost all of those costs themselves.

While a few drugs treating this devastating disease have recently entered the market, they treat only mild cases and address only some symptoms. But there may be better treatments on the horizon, as well as prevention.

In the Department of Pharmacology and Neuroscience, the intricate inner workings of the brain that most people take for granted are scrutinized daily by nationally recognized scientists who are working to unravel the mysteries of Alzheimer's.

In 2005 alone, the department received more than $6 million in new funding to study how the brain ages. That is almost double the 2004 figure and an increase of more than 500 percent since 1998, according to Glenn Dillon, PhD, associate vice president for research and biotechnology at the Health Science Center.

"The research that we do will impact the future of treatment and prevention of Alzheimer's disease — period," said James Simpkins, PhD, chair of Pharmacology and Neuroscience and director of the Health Science Center's Institute for Aging and Alzheimer's Disease Research. For those who have watched a loved one struggle with this devastating condition, that's reason to hope.

Currently, Dr. Simpkins and his team of researchers are laying the groundwork for discovering how to treat and prevent Alzheimer's disease, thanks to two program project grants funded by the National Institutes of Health. These highly competitive, prestigious grants indicate both the respect the team has earned from the nation's leading scientists and the importance of its work. One focuses on brain aging, the other on possible treatments.

Understanding how the brain ages

The first program project grant studies how the brain ages, an important first step toward understanding what goes wrong when a person develops Alzheimer's disease.

Since the brain is responsible for regulating and maintaining everything from emotions and behavior to ensuring that the lungs continue to breathe and the heart keeps beating, it is not surprising that when such a complicated organ begins to age, a number of functions are affected. Just as each individual brain is unique, so is the way it ages, so it is important to understand all of the different factors that may

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Drs. Singh and Simpkins work together to understand how the brain ages.

Speaking up about HRT

Three years ago, millions of women abruptly stopped using estrogen and hormone replacement therapy to ease the symptoms of menopause. A stunning report from the 15-year, multi-million-dollar Women's Health Initiative (WHI) implicated these therapies in an increase in heart attacks, dementia, stroke and deep venous thrombosis, a blood clot originating in the deep veins of the legs.

There was also an increase in breast cancer in women taking hormone replacement therapy (HRT), which includes estrogen and progestin, but this effect was not found for those on estrogen therapy alone. In addition, the WHI concluded that estrogen and hormone replacement therapies do not protect women's cognition — their ability to think, learn and remember — or improve their cardiovascular health.

Researchers at the Health Science Center quickly voiced several concerns about the WHI study. James Simpkins, PhD, professor and chair, and Meharvan Singh, PhD, associate professor, both of the Department of Pharmacology and Neuroscience, co-founded the Consortium for the Assessment of Research on Progestins and Estrogens (CARPE), an international group of researchers dedicated to reviewing the results of the WHI study.

The truth about HRT

The first, most significant issue CARPE voiced about the WHI study was the average age of the women when they began the study — 65, well past menopause.

"Hormone replacement therapy is not recommended for this age group, nor has it ever been," Dr. Simpkins explained. "Typically women take it beginning about age 45 to their mid-50s, during the time that their menopausal symptoms are the most intolerable."

The WHI study looked at a much older group because its intention was to study the effects of HRT on women suffering from symptoms of dementia, which would not be present in a younger population.

"The problem is that the women enrolled in the study hadn't had these hormones for a decade or more," he said. "Years of hormone deprivation likely resulted in a resistance to the benefits of the hormones. This is supported by many other studies, so we already knew the results of the WHI study before it even began."

Another problem Health Science Center researchers discovered when looking at the WHI study was that the HRT treatment was given orally. The problem with that administration method is a phenomenon called liver enzyme induction, Dr. Simpkins said. When hormones enter the body orally, the first place they go is the liver, where estrogen produces proteins that increase coagulation, or clotting, in the bloodstream.

"This explains the increase in heart attacks, which are caused by blood clots in the heart; the deep venous thrombosis, caused by blood clots in the veins; and strokes, which are caused by blood clots in the brain," Dr. Simpkins said. "The liver enzyme induction induced by *orally* administering HRT explains much of the adverse effects shown by the WHI.

"It also explains the increase in dementia [found in the study], which showed up very suddenly, instead of presenting as a slow decline, as it typically does," he said. "This suggests the women in the study were having small strokes, leading to a rapid decrease in cognition." Dr. Simpkins said it would have been better to administer HRT through an injection under the skin, which avoids liver enzyme induction.

Now, additional analysis of the data is being published both by the WHI and other researchers who have analyzed the WHI data. Further study has shown that if hormone and estrogen treatments are used as intended, around the time of menopause, many of these side effects go away, and the benefits of the therapy are apparent.

"This is great news for women," Dr. Simpkins said. "Many of them, shocked and scared by the original conclusions of the WHI, quit hormone replacement therapy. Now, they can resume it, free from worry about the serious side effects they once feared."

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impact normal brain aging, Dr. Simpkins explained. UNT Health Science Center's $8.6 million study, funded by the National Institute on Aging, is made up of five components:

- Dr. Simpkins is investigating the normal role of estrogens in brain structure and function during aging. His research addresses the impact of estrogen loss at menopause on cognitive decline, nerve cell loss and the changes in the brain that occur in Alzheimer's disease.

- Michael Forster, PhD, professor of pharmacology and neuroscience, is exploring how brain oxidation relates to cognitive decline, coordination and motor skills, both in normal brain aging and in cases of Alzheimer's and Parkinson's disease.

- Peter Koulen, PhD, associate professor of pharmacology and neuroscience, and director of the North Texas Eye Research Institute, is studying a specific set of proteins inside nerve cells that are critical to the cells' functions. These influence the behavior of nerve cells affected with Alzheimer's disease and other age-related cognitive impairments.

- Dr. Dillon and Meharvan Singh, PhD, assistant professor of pharmacology and neuroscience, are working together to study how progesterone relates to brain aging and how it communicates with the inside of the cell.

- Christopher de Fiebre, PhD, assistant professor of pharmacology and neuroscience, analyzes learning ability and psychomotor skills using laboratory models. He is trying to understand why some individuals demonstrate brain aging while others do not.

"We hope that by better understanding the biology of aging, we may be able to work together to develop treatments for the prevention of age-associated cognitive decline and neurodegenerative diseases," Dr. Singh said. With so many different

The benefits of HRT

HRT is more than a therapy for menopause; estrogen has other protective benefits that have been demonstrated for years.

Since the conclusions from the WHI were first released, researchers at the Health Science Center have conducted a number of studies examining the role of estrogens and HRT in long-term cognitive, or mental, outcome.

"Estrogen and glucose work together to help the brain function properly, and when estrogen begins to decline, women often report that they're not as sharp as they once were — they're not able to solve problems as readily," Dr. Simpkins said. "If women use estrogen during the early stages of menopause, there's some evidence that it prevents the cognitive decline often described during this time."

The Health Science Center's researchers believe that the brain begins to have trouble taking up and using glucose, its main energy source, as a result of the loss of estrogen experienced during menopause. The decline in glucose utilization likely sets the stage for cognitive decline because the brain is not able to get the energy it needs, which leads to symptoms similar to those experienced with Alzheimer's disease.

"Interestingly, as much as women struggle with hot flashes as their estrogen declines, they're really a good sign," Dr. Simpkins said. "Our studies show that hot flashes indicate the body is trying to increase its production of glucose, which will improve a woman's cognitive ability."

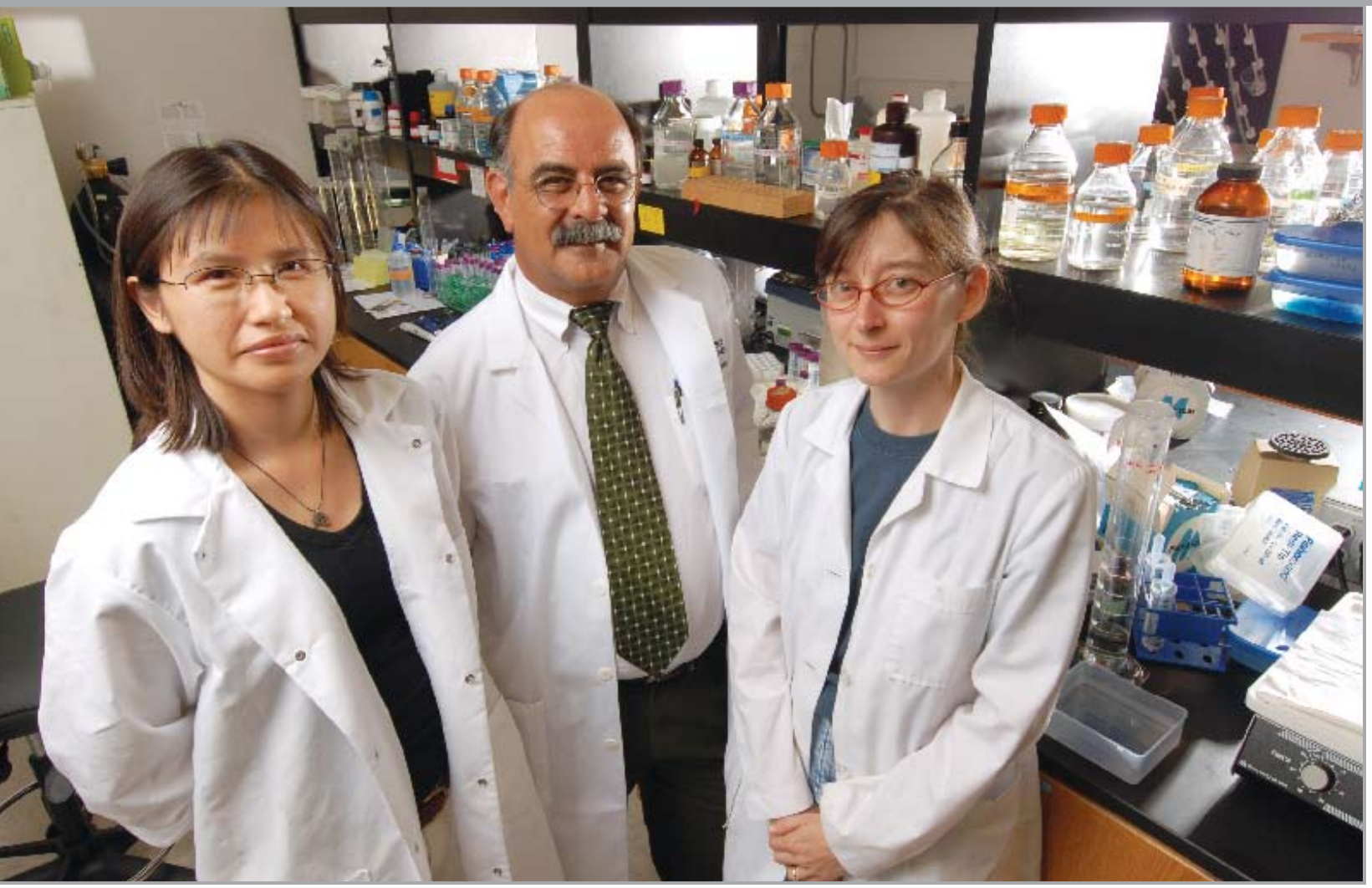
Improved cognitive ability is not HRT's only benefit. It is clear that estrogen can also help women avoid osteoporosis, Dr. Simpkins said. Reanalysis of the WHI study, as well as other studies, has shown that estrogen has a protective effect on the heart. In addition, basic science studies, as well as epidemiological data, indicate that estrogen also provides protection from strokes.

"Based on what we know now, taking hormones or estrogens for two to five years during menopausal transition is associated with very few side effects," Dr. Simpkins said.

During menopause, women should discuss the use of HRT with their physicians, Dr. Simpkins said. In addition to HRT's ability to relieve the symptoms of menopause, the potential benefits to the heart, brain, colon and bones are just too significant to ignore.

Many women scared by the original conclusions of the WHI can now resume HRT, free from worry about serious side effects.

Dr. Simpkins' lab group is gaining a better understanding of the biology of aging.



avenues to investigate, the researchers hope their efforts will lead to improved quality of life for those suffering from Alzheimer's disease, and possibly they will even learn how to prevent or delay its onset.

The next generation of therapy

In 2005, the Department of Pharmacology and Neuroscience, along with researchers at the University of Florida at Gainesville and Washington University in St. Louis, received a second program project grant from the National Institute on Aging that provides $6 million to study possible treatments for Alzheimer's disease.

"This program project grant is a continuation of research we have been working on for 15 years," Dr. Simpkins said. "The hope is that one or more of the compounds we've been working on will become part of the options for treating or preventing Alzheimer's disease."

In fact, two of the compounds are already showing promise for treatment of Alzheimer's in early clinical trials. The investigation into the first compound is being led by Ed Myers, PhD, from the University of Florida. In initial human trials with Alzheimer's patients, the first compound has been effective in treating cognitive decline and improving memory.

The trial subjects are performing better on neuropsychiatric tests, indicating that they have improved memory and cognitive ability. "Since the compound has showed some efficacy, it probably will go on to the next phase of clinical

trials," Dr. Simpkins said. "At this point, we're treating symptoms, but hopefully in the future, this compound also will be used to treat disease progression."

Dr. Simpkins is developing the second compound, a non-feminizing estrogen that also has shown promise in an early prevention study of women. In the clinical trial for this second compound, people are given the compound before they develop Alzheimer's disease to see if treatment can delay the onset of the disease or slow its progression.

In his component of this project, Dr. Koulen is studying plant lipid, or fat, compounds that protect brain cells from death. Once he determines how the lipids work, Dr. Koulen hopes to develop a compound to help treat Alzheimer's disease by protecting brain cells from dying.

"This program, unlike many scientific programs, has resulted in, to date, two compounds in clinical trials," Dr. Simpkins said. "And that's one of the reasons that this program has been sustained for so many years. It's produced what we've been trying to accomplish: we better understand Alzheimer's disease, we better understand potential therapies, and we've delivered some of these drugs to clinical trials."

Dr. Simpkins reinforces the Health Science Center's philosophy of directly correlating the latest research with effective patient care.

RESEARCH

Advanced

Technology

Imagine a microscopic probe that could be injected into your body and used to monitor blood glucose levels, precancerous cell changes or even how much rest you need. What if that probe could be read simply by placing your fingers on the keyboard of your computer, which would then let you know if it was time to take medication, visit your doctor or take a nap?

Advanced technological research can make such futuristic ideas a reality – much sooner than one might imagine. Researchers at the Health Science Center are striving to make such technologies not only useful in health care and science, but also accessible to everyone.

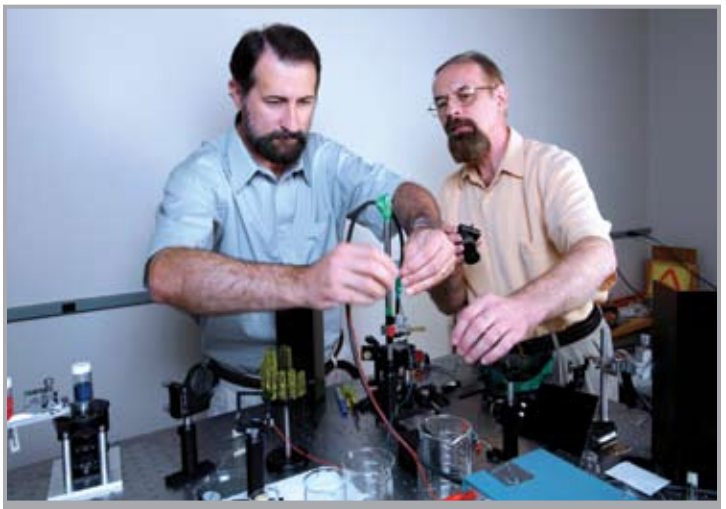
Fluorescence

Fluorescence spectroscopy uses a beam of light to excite the electrons in molecules, causing them to emit light at a lower energy level; this light is then measured and analyzed. The technique is useful in determining the structure of molecules, particularly organic compounds, and has wide applications in nanotechnology, bio-nanotechnology and plasmonics, the study of compounds smaller than a wavelength of light.

"Fluorescence is very powerful because light is everywhere," Dr. Karol Gryczynski said. "We can use light to study objects on any level, starting from very simple things like tissues down to ultrasensitive detection" of compounds such as proteins.

Karol Gryczynski, Ph.D., professor of molecular biology and immunology, and his brother Ignacy Gryczynski, PhD, professor of cell biology and genetics, co-founders of the Health Science Center's Center for the Commercialization of Fluorescent Technology, are working to develop technology that would allow tiny probes injected into red blood cells to be monitored through the use of fluorescence.

Fluorescence will allow earlier detection of many diseases, possibly saving lives.



The Gryczynski brothers are able to use fluorescence to monitor minute changes in human cells.

"We can already measure oxygen levels in the body with fluorescence," Dr. Ignacy Gryczynski said. "But fluorescence also can be used to monitor glucose levels, for example. There are many diabetics who are waiting for a non-invasive tool to measure glucose levels. We are very close to developing that. We will also be able to monitor cardiac markers for heart disease and markers for prostate and breast cancer.

"For now, the current detection level for prostate cancer, for example, is a measure of the symptoms," he said. "But sometimes, by then it is too late. Using fluorescence, we are able to detect those markers much earlier."

The Gryczynskis said being able to monitor changes in the

Dr. Prokai delineates results from the mass spectrometer to learn more about oxidative stress.

proteins of human cells using fluorescence — luminescence given off by a substance while it is exposed to radiation — will allow earlier detection of many diseases, possibly saving lives, as well as offering convenient monitoring systems for other bodily functions.

"You would have detection you could do with a computer," Dr. Karol Gryczynski said. "In the future, you could sit down with your laptop, put your hands on the keyboard, and it immediately reads all the biomarkers in your blood. It could tell you, 'You are tired. You have to rest. We will not work anymore,' and the computer will switch off. Or, 'You have to go to the doctor and check this and this.' Or your doctor will check you through the computer."

Mass Spectrometry

While fluorescence makes molecules visible, the mass spectrometer is the tool researchers use to look at these small particles. The Health Science Center added a state-of-the-art mass spectrometer to its facilities last year. Laszlo Prokai, PhD, Welch professor of molecular biology and immunology, joined the Health Science Center to work with the mass spectrometer — one of only three of its kind in the United States.

"Mass spectrometry is basically a technique that can identify compounds small and large at very low levels by measuring light," Dr. Prokai said. "Those molecules can be solid, liquid or gas, and you can detect very low quantities. With all the chemical and biological threats around, there is a need for a better method to tell you if there was an event of bioterrorism.

"If you have an alert system that is prone to give you false alarms, that may do as much harm as not having one in place at all," he said. "If you cry wolf too many times, the whole nation can become desensitized to the validity of the information. It's imperative to have in place the fastest and most accurate information possible.

"Current technology focuses on accuracy and sacrifices speed, so if you collect a field sample, you have to do a tedious process. The technology to do this quickly and accurately exists, but the application of the technology has not been addressed in this area, so we are missing out on the ultimate way to confirm a chemical or biological event."

But, as with fluorescence, mass spectrometry research goes beyond one application. Dr. Prokai is also using his research

to support drug discovery and for work in proteomics — the study of the system of proteins in the human body.

Dr. Prokai said studying oxidative stress reveals how the body ages, which in turn can allow researchers to determine the presence of Alzheimer's disease or dementia earlier in life, saving years of degeneration for many people.

"Oxidative stress is a strange paradox, because life on Earth depends on oxygen," Dr. Prokai said. "But oxygen is a highly reactive material, so while it is necessary, it can be harmful as well, if it gets out of control.

"Most chronic diseases are linked to disturbing the balance of producing energy and doing harm by way of reactive oxygen, such as in the brain," he said. "First we have to understand what is susceptible to damage in aging. Then, if you know how the damage occurs, you can find a cure or a therapy that slows, halts or prevents that kind of debilitating damage from occurring."

Dr. Prokai said while his research will not necessarily lead to reversing damage to the brain, it could very likely lead to a way to detect whether a person has a disease, such as Alzheimer's, much earlier in the process.

"Alzheimer's usually first manifests as forgetfulness," he said. "By then, the process of natural degeneration is already on its way. The brain is going to compensate for years in the beginning without having symptomatic effects on cognitive function or the ability to function as a human being. Then the brain realizes, 'OK, I cannot function like that anymore,' and it begins to shut down and preserve the function.

"While it does that, your cognitive function is going to decrease because it is trying to reach a point it can maintain," he said. "Your whole brain and body are going into oblivion, and there is no turning back. I think if you can target the period in which damage has not been done to the point of no return, then there is a chance you can maintain a level that keeps you almost fully functional and not going into that phase when you are sliding progressively into dementia."

Nanotechnology

Nanotechnology studies are also ongoing at the Health Science Center. Jamboor Vishwanatha, PhD, associate dean of the Health Science Center's Graduate School of Biomedical Sciences and professor of molecular biology and immunology, said his research in nanotechnology includes therapeutic uses.

"Nanotechnology is the study of how very tiny particles containing either a gene or a drug can deliver its contents within the body," Dr. Vishwanatha said. "We are looking at how we can direct these particles to a particular tissue. If you are delivering a drug, you would like it to go exactly where you want it to go."

Arthur Braden, PhD, post-doctoral research associate in the Department of Molecular Biology and Immunology, is working on the research with Dr. Vishwanatha. He compared their work to common capsule medications.

"Everyone knows today about various pills such as Tylenol," Dr. Braden said. "Tylenol was the first capsule to contain a drug, in this case aspirin, that everyone understood. In that era this was state-of-the-art drug delivery. You swallowed the pill, and the drug was absorbed into the bloodstream.

"Our nanoparticles are very much the same," he said. "We can encapsulate any therapeutic agent into the particle itself. We have made the capsule of an approved FDA substance identical to that used for internal surgical sutures. There are, however, very important differences with nanoparticles."

Dr. Braden said with capsule drugs like Tylenol, high doses must be administered to achieve the desired effect because the drug has to pass through the intestinal tract — a problem alleviated in nanoparticle use

"These applications are merely examples of the technologies that exist currently in our hands. The scope of application is virtually limitless."

because the drug can be delivered inside the body's cells themselves.

"What we are trying to develop is a new class of nano-pharmaceuticals," he said. "Current drug delivery is focused upon getting the substance of interest into the intracellular compartment, where it is of the most benefit. We have generated nanoparticles that are capable of releasing a drug over periods of months inside the cell. This can eliminate repeated administration of certain drugs, thus lowering the overall therapeutic dose."

The advanced technology team and their research has the potential to impact lives at all stages.

He said this technology of guiding a substance into a cell via nanoparticles can apply to gene therapy as well because DNA can be delivered using nanoparticles.

"If there is an identified genetic deficiency for a given cell type, we can either replace the faulty gene or shut the gene off," Dr. Braden said. "However, we want the particles to be more specific to given cell types. After all, we do not want to harm normal, healthy tissues and cells. We are investigating the attachment of cell-specific targeting molecules to help direct our nanoparticles toward the unhealthy cells."

He said diseases such as sickle cell anemia could be treated using nanoparticle therapy that combines the delivery of both a treatment and a gene.

"Sickled cells can adhere to vascular walls, leading to a block in blood flow," Dr. Braden said. "We are in the process of generating a protective nanoparticle that will allow for a reversal of this adhesion. It seems very promising from our preliminary data that a dose of at least tenfold less than the current treatment drug can achieve the same effect.

"Moreover, we can release a gene from the nanoparticle to sustain this inhibition," he said. "Other therapies are being developed that combine encapsulated chemotherapeutics and surface-bound, radio-labeled anti-cancer antibodies to deliver both radiation and chemotherapy in locally high doses for ovarian cancer."

Dr. Braden said the same technology could be easily modified to treat a variety of disease states, from ischemic injury from strokes to glaucoma and cancers.

"These applications are merely examples of the technologies that exist currently in our hands," he said. "The scope of application is virtually limitless."

Dr. Karol Gryczynski compared emerging nanotechnology and fluorescence technology to the world of computers. Just as computers were once large, expensive and exclusive to only a few people, now anyone can buy a laptop relatively inexpensively and log on to the Internet.

"There were a few guys who realized, 'We can do this much cheaper,' and then everyone who wanted could use computers," he said. "Now what's happening is they have become cheaper, and suddenly you find your kid cannot even go to school without a computer — it is as needed as a pen was 50 years ago. I believe at this point, when fluorescence is so sensitive and there is so much interest, it would be a great investment, and so many things can happen."

The Gryczynskis' goal in the Center for Commercialization of Fluorescent Technology is just that — to develop the technology to the point where commercial uses for the technology expand and the necessary equipment becomes less expensive.

But health care is not the only application for fluorescence, the Gryczynskis said.

"We can collaborate mass spectrometry and fluorescence to detect explosives," Dr. Ignacy Gryczynski said. "It's very complementary."

If emerging nanotechnology and fluorescence can be developed to make them more accessible, they could be used in applications beyond health care. For example, they could help detect small amounts of explosives more accurately than current methods.

Dr. Vishwanatha uses nanotechnology to investigate the delivery of tiny particles to tissues in the human body.

"If you go to the airport, you might see dogs sniffing your luggage," Dr. Karol Gryczynski explains. "Essentially, the dogs smell a very low number of molecules that bind with their receptors, and they can sense the smell of narcotics or explosives. What we can do with fluorescence is develop a very simple device that works like this kind of sniffing nose, which has air flowing through it, and we can look for molecules of explosives appearing in the air."

Dr. Ignacy Gryczynski said explosives could be detected in water as well using fluorescence technology.

"At this point, it would be nice to have some kind of early alert system to use at schools or airports that would tell us that something is happening, tell us there is a tiny amount of something in the air – anthrax, for example," Dr. Karol Gryczynski said. "If we can develop this with this sensitivity level, then it becomes very important. If we can detect, we can protect. It will not solve all the problems humanity has, but it can be very helpful."

Alone and in combination, the advanced technology research underway at the Health Science Center has the potential to impact lives at all stages, from prevention and treatment of disease to the ability to monitor and maintain public health. But the potential benefits stretch beyond health care; these technologies will provide less expensive, more accessible means to protection against potential terrorist attacks.

RESEARCH

DNA Identity

Laboratory

One night in 1984, 16-year-old Marci Bachmann ran away from her home in Vancouver, Wash., and never came back. Ten months later, a nature photographer hiking in the woods near Missoula, Mont., spotted human remains emerging from a shallow grave. For two years, police had no clues to the identity of the female victim, who had been shot three times. Then in September 1986, Wayne Nance was shot to death as he attempted another of what was determined to be a series of murders, and evidence linked him to the body, known locally as "Debbie Deer Creek."

The girl had thumbed a ride into town in 1984, identifying herself as Robin, and was befriended by Nance. To explain her disappearance, he told acquaintances she had left town.

For more than 20 years, the two cases sat open. More than 500 miles apart, no evidence connected the Washington runaway to the Montana remains.

Then in August 2004, Missoula police submitted samples of Debbie Deer Creek's remains to the DNA Identity Lab at the Health Science Center. Researchers extracted DNA from the samples and entered the genetic profile into the FBI National Missing Persons DNA Database.

In 2005, a task force investigating another serial killer, Gary Ridgway, known as the Green River Killer, took up the Bachmann missing persons case; her disappearance corresponded to the time Ridgway was operating in the Seattle area. The task force obtained a DNA sample from Bachmann's mother and sent it to the Health Science Center. Analysts at the identity lab uploaded the genetic profile into the missing persons DNA database in March 2006.

That's when researchers at the lab got an unexpected match.

Although Bachmann's disappearance turned out to be unrelated to the Ridgway case, her mother's sample matched the genetic profile of the remains found in Montana.

"We found a strong correlation between DNA from Bachmann's mother and the remains," said Arthur Eisenberg, PhD, director of the DNA lab and professor of pathology and anatomy. "Once our analysts saw it, they contacted the task force in Washington."

The task force sent additional samples from Bachmann's brother and father to the lab to confirm the match. The report the DNA lab provided enabled the King County, Wash., authorities to formally identify the remains as Marci Bachmann.

In April, Bachmann's three brothers arrived in Missoula to retrieve her remains. Bachmann's brother Derek, who had spent years looking for his sister, could now put her to rest. "There was always that hope that she would walk in the door one day with my nieces and nephews," he told *The Portland Oregonian*.

Using science to resolve paternity issues and solve crimes

Identifying Marci Bachmann wasn't the work of a few hours or even a few days — it was the result of more than 15 years of effort by the DNA Identity Lab and Dr. Eisenberg.

Dr. Eisenberg began working in the newly established field of DNA identification in the 1980s when he co-developed the first DNA lab test to establish paternity. In 1989, Dr. Eisenberg joined the Health Science Center and established the DNA Identity Lab with support from the state. The

initial focus of the lab was to provide paternity testing for the Texas Attorney General's Child Support Division.

The lab took shape as not only a testing center but also as a hub for research aimed at advancing the DNA testing process. "It's very much applied research. We're working on ways to make these tests more cost effective, more timely," Dr. Eisenberg said.

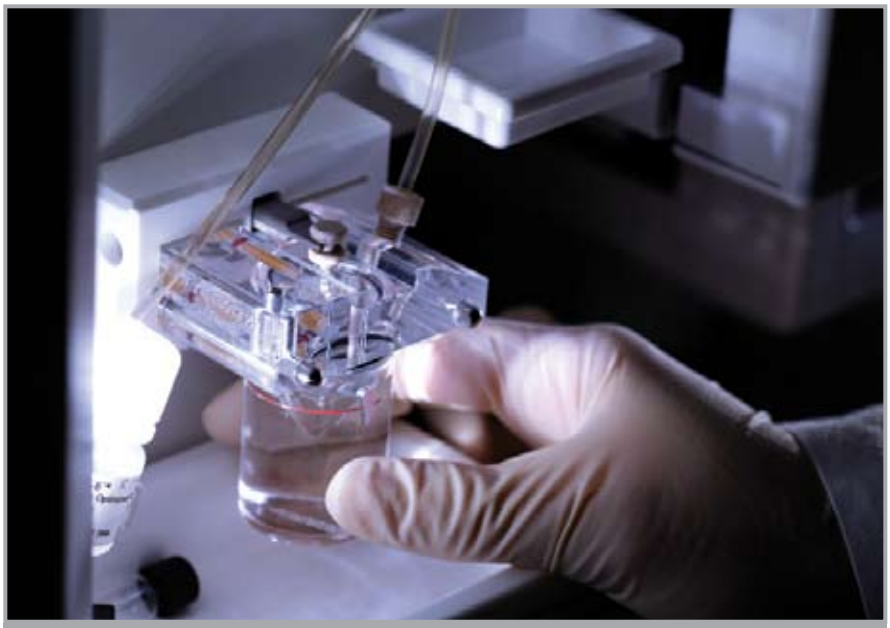
In conventional testing, the chemical code that contains the genetic instructions for all living things is extracted from the nuclei of cells. About one-tenth of one percent of human DNA differs from person to person; these variable regions can be analyzed to generate a unique profile of each individual, except identical twins. Since children inherit half their DNA from each parent, testing can show if the DNA of one individual is derived from another.

The process isn't as simple as television shows portray. "It's a very slow process — not like you see on 'CSI' where they can get results in 45 minutes," Dr. Eisenberg said. "It can take weeks or months."

Identification of missing persons

In 2000, John Planz, PhD, joined the Health Science Center as associate professor of pathology and anatomy and assistant director of the DNA Identity Lab. Dr. Planz brought expertise in the field of mitochondrial DNA (mDNA) testing, a process well-suited to forensics.

This lab is one of three facilities in the country allowed to contribute directly to the National Missing Persons DNA Database.



A researcher extracts the nuclei of living cells to discover their genetic pattern.

These tests analyze DNA extracted from the mitochondrion, an energy-producing cellular organelle. Biological samples from hair, bones and teeth lack cell nuclei used in conventional DNA testing but contain mDNA, allowing a wide range of crime scene evidence to be analyzed.

They were soon given the opportunity to take advantage of Dr. Planz' expertise: in 2001, the Texas Legislature announced the creation of the Texas Missing Person's DNA Database, to be housed in the Health Science Center's DNA Identity Lab. The database, established with funding from the Texas Crime Victims' Compensation Fund, contains genetic profiles from three sources: unidentified human remains, family members of missing persons, and missing persons themselves, from biological samples obtained from toothbrushes, hairbrushes, etc.

With creation of the database, the lab became one of three facilities in the country allowed to contribute directly to the National Missing Persons DNA Database, which is part of the FBI's Combined DNA Index System (CODIS), a network of databases that federal, state and local crime investigators use to compare DNA profiles. To contribute to CODIS, the lab had to be accredited by the National Forensic Science Technology Center. The Health Science Center is the only academic institution to earn this accreditation.

The database immediately became a powerful tool for law enforcement — and a powerful source of hope for family members. "Within the state of Texas, 70,000 to 80,000 missing persons reports are filed each year," Dr. Eisenberg said. "The law now states that families have to be told about the existence of the database and given the voluntary right to provide a DNA sample." There is no cost to the families for these services.

Texas law also mandates that law enforcement agencies retain a reference sample of unidentified found remains for submission into the database. The DNA analysis is performed and uploaded into the database at no cost to law enforcement agencies, which is especially beneficial for small, local departments that lack the resources to do DNA analysis, Dr. Eisenberg said. In addition, the Health Science Center's DNA lab is able to perform the analysis relatively quickly, which is helpful for bigger departments with large case backlogs, he said.

The lab began accepting samples in January 2003 — and results came quickly. In August 2003, the lab positively identified 35-year-old Alejandro Gomez, who was reported missing in Dawson County, Texas. Remains suspected to be his were identified after obtaining samples from Gomez' mother.

The success of the Texas database helped the lab expand its mission nationwide. Federal funds became available in 2004 under the President's DNA Initiative, with the lab receiving grants totaling $1.9 million to solve missing persons cases and identify human remains from across the country.

The lab went to work and to date has identified more than 50 missing persons. At least four of these identifications were "cold" hits — cases like

Testing Ticks with DNA Tools

Get sick in Texas from a tick bite, and you might think you're infected with Lyme disease. But odds are good that you have another illness, one about which scientists know little. Southern Tick-Associated Rash Illness has Lyme disease-like symptoms, and if left untreated, it can cause arthritis, nerve damage and heart problems.

Scientists in the DNA Identity Lab at the Health Science Center are seeking to unearth the mysteries of this disease. The research is seemingly unrelated to paternity and forensic testing, but in fact, scientists are using similar tools to study this pathogen.

Specialists gather samples in the field to study ticks and their DNA.

Researchers have a good understanding of the deer tick and the Lyme-causing bacterium it carries, *Borrelia burgdorferi*. However, in the mid-1990s scientists learned they were facing a completely different tick and pathogen in Texas: the Lone Star tick and its *Borrelia lonestari* bacterium.

"We had to take a step back and do some basic science," said Phillip Williamson, PhD, a specialist in molecular genetics research and head of the Tick-Borne Diseases Laboratory.

Part of the challenge? "No one can grow it," Dr. Williamson said of the bacterium. Dr. Williamson has instead used molecular methods to study the organism at the DNA level.

The lab works with the Texas Department of Health to test ticks sent in by the public for diseases such as Rocky Mountain spotted fever.

Dr. Williamson is also compiling genetic information about many organisms in the tick population that have the potential to be used as bioweapons, and he is developing DNA-based testing systems to detect the organisms in the environment and in clinical samples. Meanwhile, the lab carries on its work on *B. lonestari*.

"We're looking at what's really here and what's really a risk," Dr. Williamson said. "It's not glamorous, but it's something that needs to be addressed."

The lab took shape as not only a testing center but also as a hub for research aimed at advancing the DNA testing process.

Bachmann's where no other evidence linked the remains with a known missing person.

Dr. Eisenberg said he expects the number of identifications to grow in the next few years. "We've received more than 2,000 samples, and every day we're plugging away trying to get more into the database," he said.

Closing cases

The lab recently received notification of a second round of Department of Justice funding, a $1.4 million grant to continue their missing persons work.

"It's a way to provide information about a loved one to the family," Dr. Eisenberg said. "People use the word 'closure.' Hopefully I'll never really know what that means, but you have families that go 10 or 20 years or more not knowing where their loved one is. At least now they know. What we can do is provide information — and closure, if you will."

While the Bachmann case is closed, the lab hopes to help a fellow victim. "There is another set of remains in Missoula from another victim of Wayne Nance that for years sat in a box side by side with Marci. We're now getting those remains," Dr. Eisenberg said. "We hope we can give her a name."

CODIS and TMPDD

HOW MISSING PERSON IDENTIFICATION IS MADE

Missing Person reported to police

Police Department determines if reported missing person fits the "High Risk" category

High Risk is verified

Law enforcement agency calls TMPDD and asks for a Family Reference Sample Collection Kit

Family Reference Samples are collected by law enforcement agency and sent to TMPDD

Reference Samples are received and processed by TMPDD

Reference Samples are tested and DNA Profiles generated

DNA Profiles of Reference Samples are entered into CODIS

Reference Sample Profiles are searched against all CODIS Remains Profiles

Unidentified Human Remains found

If a Medical Examiner's office is available, the police notify the ME Office which recovers the remains and verifies human origin

ME Office or Police Department call TMPDD to request appropriate forms and evidence boxes for sending the remains

Remains are received by the UNT Forensic Anthropologist and are processed and sent to TMPDD

Remains Samples are received and processed by TMPDD

Remains Samples are tested and DNA Profiles generated

DNA Profiles of unidentified remains are entered into CODIS

Unidentified Remains Profiles are searched against all CODIS Reference Profiles

MATCH OCCURS

Osteopathic Research

To some, osteopathic manipulative treatment seems like a foreign, New Age approach to health care. To others, manipulative treatment means the difference between a normal life and daily pain.

Researchers at the National Osteopathic Research Center, housed at the Health Science Center, believe manipulative treatment may prove not only to alleviate pain, but also to reverse the effects of illnesses such as pneumonia, carpal tunnel syndrome and ear infections without the use of medication.

Led by Scott Stoll, DO, PhD, executive director of the ORC and associate professor and chair of the Health Science Center's Department of Manipulative Medicine, the center examines how manipulative treatment works.

Manipulative treatment is the gentle movement of the musculoskeletal system to alleviate pain and reverse the side effects of some disorders.

"For example, a misaligned joint puts pressure over a vein. If you stretch out the surrounding muscle, you can relieve the congestion," Dr. Stoll said. "In carpal tunnel syndrome, for example, if you can stretch out that canal, the nerve will work better."

Dr. Stoll said manipulative treatment also alleviates congestion in the body's fluid flow, allowing for better function of the body's systems as well as more effective elimination of waste products.

"It's like a huge interstate with a traffic jam," Dr. Stoll said. "If you can alleviate that blockage, then the traffic will flow better, up and down stream."

Manipulative treatment helps get nutrients to the tissues and removes waste products, which supports the body's immune system. Dr. Stoll said manipulative treatment is not used in lieu of other medical treatments, but in addition to them to fully optimize a patient's health.

"If you use your hands, you can get circulation in and toxins out," he said. "It is a complementary practice — just another tool that goes into my resource bag. You can generally judge from case to case what is the best method of treatment."

Dr. Stoll used the example of otitis media to explain. He said in the birthing process, asymmetry affects the ears of some children. This deformity allows for muscle tension to form at the base of the skull, causing a building of fluid in the eustachian tubes that blocks them. Dr. Stoll said the ORC is researching how to feel that asymmetry, then guide and release the tension in the muscles, allowing the fluid in the tube to drain.

The ORC is currently seeking funding to study this disorder and how manipulative treatment can help alleviate the problem in some children.

"Osteopathic manipulative medicine (OMM) is used for a variety of things," Dr. Stoll said. "In general, manual medicine is designed to reverse somatic dysfunction and tension in disorders ranging from diabetes to multiple sclerosis to ear infections."

He said studies have shown that manipulative treatment also helps alleviate lower back pain and chronic back pain. Studies conducted by a team of manipulative treatment specialists from five clinical sites across the United States are currently investigating whether osteopathic manipulative treatment is effective in shortening the length of hospital stays and decreasing the amounts of antibiotics needed to treat pneumonia.

Center

Manipulative treatment helps alleviate chronic pain in patients with various disorders.

"It can also help better deal with the physical stress of pregnancy," Dr. Stoll said. "In pregnancy, the patient can't really take medicine. The body goes through tremendous changes in its center of gravity, as well as strain and compression. Manipulative treatment helps the body relax and cope with the strain."

To support the study of the many areas in which manipulative treatment can be effective, the ORC was established in 2001 with an initial investment of $1.1 million over a four-year period from the American Osteopathic Foundation, the American Osteopathic Association and the American Association of Colleges of Osteopathic Medicine. These same osteopathic organizations have re-funded the ORC, bringing their total investment to $2 million over an eight-year period.

The ORC has received additional funding in support of its research from the National Institutes of Health, the Osteopathic Heritage Foundation and other organizations.

Michael Smith, PhD, chair and professor of integrative physiology and research director for the ORC, was awarded a $1.8 million research grant from the National Institutes of Health's National Center for Complementary and Alternative Medicine in 2004 to study the impact of OMM on the body. It was the first time the NIH awarded such a large grant to fund the study of manipulative treatment.

"We live in an evidence-based medical age," Dr. Smith said. "It is important for us to understand the impact of osteopathic manipulative treatment on the body."

The three-year study, which is a collaborative effort between the Health Science Center and the Arizona College of Osteopathic Medicine, will use three research emphases.

The first looks at how the treatment affects the body at the tissue level, and the second studies how it alters blood and lymphatic flow to different areas of the body. The third looks at how manipulative treatment reduces pain in patients by studying their sympathetic nervous system, which activates what is commonly called the "fight or flight response."

NIH's National Center for Complementary and Alternative Medicine also awarded John Licciardone, DO, MS, MBA, professor of manipulative medicine and director of clinical research for the ORC, a $778,231 grant in 2005 to conduct the largest, randomized, controlled trial of manipulative treatment ever undertaken in subjects with low back pain.

Additionally, Dr. Stoll received a $568,000 NIH grant in November 2005 for a three-year clinical trial to examine whether an eight-week regimen of osteopathic manipulative treatment will have immediate and lasting positive effects

Dr. Licciardone treats chronic back pain and other musculoskeletal disorders.

on the symptoms, functional limitations and physiologic impairment associated with carpal tunnel syndrome.

The Osteopathic Heritage Foundation and the Foundation for Osteopathic Health, in association with a consortium of private osteopathic foundations, awarded a two-year, $1.5 million grant in 2003 to support a multi-site clinical research project to study the efficacy of osteopathic manipulative therapy in elderly hospitalized patients with pneumonia.

The study is being coordinated by the Osteopathic Research Center in conjunction with principal investigator Donald Noll, DO, of A.T. Still University. Participating clinical research sites include the Kirksville College of Osteopathic Medicine in Missouri, the Health Science Center's Texas College of Osteopathic Medicine, the University of Medicine and Dentistry of New Jersey-School of Osteopathic Medicine, Mount Clemens General Hospital in Michigan, and Doctors Hospital in Ohio. The researchers anticipate that the study will conclude in February 2007.

The Osteopathic Heritage Foundation also awarded the ORC $249,168 in 2002 to examine the effect of osteopathic manipulative treatment during and after pregnancy. Results were to be reported this fall.

The Osteopathic Heritage Foundation awarded the ORC an additional $2 million in May 2006 to fund two Heritage Research chairs and their staffs for four years.

Each of the two teams will include an osteopathic physician with OMM experience, a scientist with experience in biomechanics, a clinical research coordinator and a research assistant. The goal is to determine the effects of the addition of osteopathic manipulation to current medical practice. The teams will help design, fund and conduct research projects, as well as provide research training to osteopathic medical students throughout the country. Dr. Licciardone was selected as the first Osteopathic Heritage Foundation Clinical Research Chair.

Dr. Licciardone said the grant will allow him to further study the use of osteopathic manipulative therapy for the treatment of chronic low back pain and other musculoskeletal disorders, refine placebo control treatments for pain and functioning, assess body-to-organ and organ-to-body manifestations of disease, and describe the natural history and epidemiology of somatic dysfunction.

The outcomes of individual studies are important to ORC researchers, but their ultimate goal is to promote the overall acceptance of manipulative treatment as a viable medical treatment method, Dr. Stoll said. With proof of its effectiveness on record, manipulative treatment may become more widely used by specialty physicians, integrated into patient care processes in hospitals, and integrated as procedures more readily covered by insurance companies.

"Proving the efficacy of manipulative treatment in large, scientifically controlled clinical studies could move it into generally accepted use for all mainstream medicine," Dr. Stoll said. "Any new treatment tool or method that proves effective can mean lower healthcare costs and, most importantly, the potential to relieve suffering."

Health Disparities

While preventive medicine and new advances in medical technology have expanded the overall health of Americans since the 1940s, the differences between the physical health of certain groups and society in general have become more divergent.

The infant mortality rate among African Americans is more than double that of non-Hispanic whites. The death rate for all cancers is 30 percent higher for African Americans than for non-Hispanic whites, and for prostate cancer, the rate is more than double. African American women have a higher death rate from breast cancer even though the rate of mammography screening is nearly equal for non-Hispanic whites and African Americans. Among Hispanics living in the United States, the rate of death from diabetes is twice that of non-Hispanic whites. Hispanics also have higher rates of high blood pressure and obesity than non-Hispanic whites.

According to the federal initiative Healthy People 2010, a national initiative supported by various groups both within and outside of the federal government, these differences — called health disparities — are associated with a variety of factors: gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation.

The demographic changes that are anticipated in the United States over the next decade will likely increase the importance of addressing disparities in health status. To ensure the future health of the nation, researchers and health care providers have begun to address these issues of health disparities. Here at UNT Health Science Center, we are calling this issue "health equity," and through ongoing outreach programs and research, we have established ourselves at the forefront of this battle.

In support of these efforts, the National Institutes of Health awarded the Health Science Center a $7.25 million grant in 2005 to establish the Texas Center for Health Disparities, called the Texas EXPORT Center. The grant, known as Project EXPORT - Establishing Exploratory Centers, will be funded for five years by NIH's National Center on Minority Health and Health Disparities. It is one of only six such centers in the U.S.

"We are engaging our facility in three different actions: research, community outreach, and education and training," said Jamboor Vishwanatha, PhD, associate dean of the Graduate School of Biomedical Sciences and director of the Texas Center for Health Disparities.

Research

Researchers at the Health Science Center are studying the issues involved in the lack of accessible health care, especially in the Hispanic community. Alberto Coustasse-Hencke, MD, MBA, DrPH, research assistant professor of health management and policy in the Health Science Center's School of Public Health, said the inaccessibility of health care for America's poor is overwhelming.

He said his studies have shown there are three barriers to health care, especially in the Hispanic population: lack of insurance, language barriers at check-in areas at health care institutions and language barriers with physicians.

These barriers strain the health care industry as a whole, he said. Dr. Coustasse and other Health Science Center researchers are currently studying the financial impact of treating uninsured people in Tarrant County's hospitals.

"If you don't have accessibility, the emergency room becomes your clinic," Dr. Coustasse said. "This results in

a higher number of complications with diseases like diabetes.

"Lack of accessibility in health care is like a snowball. It is all related — you have an increase in infant mortality, in women's problems," he said. "Lack of accessibility to health care results in worse health. But it's not just with Hispanics. It is true of poor people across races and ethnicities. If you are poor, you are poor."

Roberto Cardarelli, DO, MPH, assistant professor of family medicine and director of the TCOM Division of Education and Research, is the principal investigator for one of the EXPORT Center's primary research projects, "Cardiovascular disease, perceived discrimination, social support, and sense of control: Understanding biological pathways." This study is also known as the "North Texas Healthy Heart Study."

"What we're trying to understand is the relationship between different stressors and coping mechanisms that either affect or protect people from cardiovascular disease," Dr. Roberto Cardarelli said. "Our primary study is looking at experiences of perceived discrimination among African Americans, Hispanics and, as a comparison group, whites.

"Our hypothesis is that experiences of perceived discrimination are a form of stress and may contribute to the development of heart disease," he said. "Having this exposure over a lifetime could negatively affect health because of sustained levels of stress. We're also looking at individual social support and how people cope in ways that can protect them from stress."

Kathryn Cardarelli, PhD, MPH, assistant professor of epidemiology, is working on the North Texas Healthy Heart Study with Dr. Roberto Cardarelli, her husband. She said the study is looking beyond the biological risk factors for cardiovascular disease, the number one killer in America, with the hope of determining why some populations are more at risk for the disease than others.

Assessing patient lifestyles beyond the biological risk factors will increase physicians' ability to treat patients effectively.

"In the past 30 years, we have determined risk factors for cardiovascular disease, such as smoking, obesity and family history," Dr. Kathryn Cardarelli said. "The public health research focus has shifted in the last 10 years to societal factors in disease and death."

She said the study is focusing on discrimination individuals experience in their daily lives. "We were trying to think, 'What is it about being black or Hispanic that contributes to heart disease, independent of traditional cardiac risk factors?'" she said. "Discrimination came to mind."

"Discrimination is something that is perceived and internalized by an individual," Dr. Roberto Cardarelli said. "It's not something we can observe objectively. It's

very hard to do because there are about a million things that could affect this. You can talk about experiences of perceived discrimination, but someone who has a very good coping mechanism may not allow negative experience to bother them."

He said a tool to assess patient lifestyles beyond the biological risk factors that are usually measured could increase physicians' ability to treat patients based on all factors and aspects of their lives.

"I think this will motivate our medical education system to start teaching clinical competency to better understand various cultures," he said. "Say we find our scale for stress to be correlated to cholesterol levels. We could suggest meditation or exercise. We can ask, 'What is your living situation? How is your family support? Do you go to church? Do you have a good support system there?' Also, what about socioeconomic levels, income, education levels and how all these influence how someone handles things? The relationships are very intricate and very complicated.

"As DOs in family medicine we look at the psychosocial, the whole aspect of life. This will give us a tool to really objectively measure these factors," he said.

The Cardarellis' study is recruiting 75 African Americans, 75 Hispanics and 50 Caucasians through NorTex, the North Texas Primary Care Practice-Based Research Network. Dr. Roberto Cardarelli is the executive director of NorTex, a collaboration of 54 clinics in North Texas that work together to recruit individuals for research related to primary care and public health, such as the Cardarellis' current study.

Education

Dr. Vishwanatha said the education focus of the EXPORT Project is aimed at increasing the number of underrepresented minority undergraduate students in biomedical and minority health research, the number of underrepresented minority faculty in health care research, and the participation of underrepresented minority students in doctoral programs.

Through ongoing outreach programs and research, the Health Science Center has established itself at the forefront of the battle against health disparities.

The EXPORT Project works with the Health Science Center's Office of Special School Programs through the McNair and SMART (Summer Multicultural Advanced Research Training) programs to increase the opportunities for underrepresented minority students to enter biomedical graduate programs.

The EXPORT Center also supports post-doctoral training for underrepresented minorities. "We came up with a novel program called the STAR (Steps Toward Academic Research) Fellows Program," Dr. Vishwanatha said. "We bring 10 faculty members from minority institutions around the country to the Health Science Center. They get training in a variety of aspects of health disparities work. For one year, they learn how to write grant applications and get involved in research projects. In coming years, we will use that work as a basis for future funding."

The STAR fellows can take advantage of on-site faculty development and education, as well as distance learning techniques to learn the skills necessary to create health disparities research initiatives. The program is all-expenses-paid for the fellows, and it allows them to maintain their regular faculty positions while in the program.

The STAR fellows prepare grant applications as part of the fellowship program, and they have the opportunity to submit the applications to the Texas EXPORT Center for funding consideration after they complete the program.

Dr. Vishwanatha said these programs benefit underrepresented minority students and add diversity to the biomedical sciences and health care fields, but they also benefit underserved communities. "Minority researchers and health care providers often choose to serve their own communities," he said.

Community Education

Despite the research and education the EXPORT Center conducts, health disparities cannot be minimized or eradicated without those ideas being put into action.

Mary Luna Hollen, PhD, RD, LD, public health project coordinator in the Health Science Center's School of Public Health, said the Promotores de Salud Alliance uses members of local Hispanic communities to educate other members of the community about ongoing health issues.

The community members are trained in areas of health education, including ways to prevent and control disease, then they, in turn, educate others in homes, churches and community centers throughout the Metroplex.

"The Promotores de Salud program educates Hispanic families on health topics, recruits study participants and documents research data for grant projects, follows up with families, and provides referral sources," Dr. Luna Hollen said. "The promotores respond to community organizations' requests for health presentations and volunteer at health fairs. They attend health conferences, training and skill development programs, and participate as presenters at health conferences and workshops.

"But most importantly, they continue to connect with their communities after the studies are over, creating community health capacity by helping to build and sustain healthy lifestyles," she said. "Empowerment is, of course, an important outcome of their work — empowering both themselves and the people they engage with."

Dr. Luna Hollen said the promotores program strives to uphold three primary goals — to provide the Hispanic community with health education, to engage the community in healthy activity and to maintain healthy families in the community.

She said the effect of the program in the involved communities is exponential, because as promotores are trained and do their work, they train others to become involved in the program.

"The strategy of utilizing Promotores de Salud is a form of participatory research where you actively engage community members in healthy lifestyle behaviors," Dr. Luna Hollen said. "For example, you recruit individuals from underserved communities to become promotores, and they recruit families to join them in their cause to develop healthier communities."

She said the promotores work is also impacting health disparities research.

"Ecological and cultural variables, such as values, beliefs and behaviors, are more reliable predictors of health outcomes to show group differences than race and ethnicity, which often merely serve as proxies," she said. "People like promotores, who are well-grounded in the culture, are needed to help identify these predictors of health and/or disease, and thus target ways to reduce health disparities.

"Promotores can also help health professionals and researchers redesign instruments and processes to reduce biases in studies, and hence begin to target true health disparities."

One of the Health Science Center's biggest successes in outreach activities is Fort Worth's annual Hispanic Wellness Fair, which the Health Science Center co-founded. The fair started in 1999 with about 2,000 participants and has grown annually — the 2006 fair attracted an estimated 16,000 participants.

The fair offers free screenings and services to all members of the community, including vision exams, prostate cancer screenings, HIV/AIDS tests, respiratory screenings, dental exams, mammograms, glucose tests, immunizations for children, diabetes screenings, nutrition screenings and osteopathic manipulative treatment.

The promotores program provides the Hispanic community with health education and engages them in healthy activities.

Outreach

"If we can get it into the minds of elementary students that they can do this — that there's actual science they can do — I can only say it can improve society," said Eric Gonzales, PhD, who understands first-hand what this one goal of outreach programs available at the Health Science Center can do to help change the world of scientific research as well as the worlds of the students involved.

The outreach programs at the Health Science Center offer graduate students the opportunity to become mentors.

Dr. Gonzales began his experience with the outreach programs as a student at J.P. Elder Middle School, an Adopt-a-School partner with the Health Science Center. He also attended North Side High School, another Adopt-a-School participant.

Dr. Gonzales went on to participate in the McNair Scholars Program, where he met the man who would mentor him and change the course of his studies and future career, Glenn Dillon, PhD, professor of pharmacology and neuroscience and associate vice president of research.

Dr. Gonzales attended the University of Texas at Austin after graduating from high school. He said he originally intended to be a medical practitioner, but the McNair Scholars Program, which provides college seniors and new graduates an opportunity to participate in research at the Health Science Center, brought him back to Fort Worth and introduced him to basic biomedical sciences research.

"The requirement is that you have to be from either an underrepresented minority in science, which is Hispanic, African American and Native American, or you have to be a first-generation college student," he said. "I happened to fall into both categories. I joined up and got connected with my mentor for the next five years, Dr. Glenn Dillon."

Dr. Gonzales said he worked in Dr. Dillon's lab during his time as a McNair scholar, and after receiving his bachelor's degree in biochemistry from UT, he continued to study under Dr. Dillon and earned a doctorate in pharmacology and neuroscience from the Health Science Center's Graduate School of Biomedical Sciences.

Dr. Gonzales went on to a post-doctoral position at the Vollum Institute at the Oregon Health and Science University in Portland, Ore., doing research based on what he studied and learned at the Health Science Center.

Robert Kaman, JD, PhD, associate dean and director of

The outreach programs at the Health Science Center allow students to take advantage basic skills training and encourages them to seek careers in health-related fields.

outreach for the Graduate School of Biomedical Sciences, said the goal of the Health Science Center's outreach programs is to increase the number of underrepresented minority students entering biomedical science and health professions. He said the outreach programs have positively impacted thousands of students.

"We are the leading health science center in Texas in minority graduate enrollment and have been since 1999," Dr. Kaman said. "Our outreach programs now have reached well over $15 million in current total funding — about $2.5 million a year."

The Health Science Center offers several programs for students from elementary age through doctoral studies and post-doctoral work that encourage them to study and work in scientific and health-related fields. The programs also encourage graduate students at the Health Science Center to become mentors.

"Eric is a good example of someone who has taken advantage of the basic plan of the programs," Dr. Kaman said. The idea is to reach kids at each step in their education and encourage them to keep coming back to the Health Science Center for their graduate work, ultimately earning a doctorate and going on to be scientists or health care providers who will serve as role models to encourage others behind them to take the same path."

Faculty, students and staff from the Health Science Center serve as mentors, present classroom demonstrations and lectures, and host students on campus visits. High school students rotate through the center's clinics and laboratories during their junior year for six-week preceptorships.

Outreach programs at the Health Science Center include:

The Minority K-12 Initiative for Teachers and Students (MKITS) program, also known as More Knowledge in the Sciences, is a five-year NIH-funded program geared to help students from schools with predominantly minority enrollment take advantage of educational opportunities in

the biosciences and public health. MKITS also is designed to train and support Health Science Center students as resources for the school district's elementary, middle and high school students and teachers by placing graduate student fellows in the classroom to assist in teaching science concepts with modern day technology;

Project SCORE trains and supports biomedical sciences graduate students to serve as resources for biology students and teachers at predominantly minority high schools in Fort Worth. Designated as "fellows" and supported by a National Science Foundation initiative, eight students enrolled in the Graduate School of Biomedical Sciences work in pairs for 10 hours a week in one of four local high school biology classrooms to develop more effective inquiry-based, hands-on science laboratory exercises;

Summer Multicultural Advanced Research Training Program (SMART) students spend 10 weeks during the summer in the labs of Health Science Center faculty. They conduct focused research projects, attend biomedical sciences class and prepare an oral and written presentation at the conclusion of their study. Participating students are college sophomores and juniors from around the country;

The McNair Scholars Program allows undergraduate students to spend summers at the Health Science Center doing graduate-level study and research. Up to 20 junior and senior undergraduates from seven partner institutions receive workshop training to enhance their study and learning skills, work in research labs, and participate in other activities designed to facilitate their entry into the doctoral program at the Graduate School of Biomedical Sciences or at other graduate institutions;

MORE (Minority Opportunities in Research and Education), funded by the National Institutes of Health, provides graduate research assistantships for up to 12 graduate students each year. MORE scholars are offered several additional training programs to enhance their performance skills in graduate school;

GO Force was created and funded by the Texas State Coordinating Board of Higher Education to provide mentoring and tutoring of minority students in Fort Worth high schools by Health Science Center graduate, public health and medical students;

The HBCU Undergraduate Collaborative Summer Training Program in Prostate Cancer gives junior-level undergraduate students from Historically Black Colleges or Universities the opportunity to gain experience in a research laboratory under the supervision of faculty and senior graduate students. Participants are awarded full-time, 10-week, faculty-mentored summer research internships that include stipends and two semester credit hours that may be transferred to their undergraduate institutions; and

The STARS (Summer Training Among Research Scientists) Program also awards full-time, 10-week, faculty-mentored summer research internships to college juniors majoring in the life sciences who intend to pursue doctoral degrees. The internship includes a stipend and the opportunity for the students to present their research at the end of the program.

The Health Science Center has also supported the Bridges to the Doctoral Degree program since 1994. First-year master's students from four Historically Black Colleges and predominately Hispanic institutions are accepted as Bridge Scholars and awarded scholarships during the second year of their master's work. They are then accepted

We are the leading health science center in Texas in minority graduate enrollment and have been since 1999.

into the Graduate School of Biomedical Sciences' doctoral program and receive institutional support during their first two years.

"I would say we work with literally thousands of students, and hundreds each year participate in our on-campus programs," Dr. Kaman said. "We have federal, state and local funding for close to 100 students either as summer research interns or in support for doctoral programs, and masters students in the School of Public Health as well."

Rustin Reeves, PhD, assistant professor in the Department of Cell Biology and Genetics and director of Project SCORE, said his background as a high school science teacher is what motivated him to work with students outside of the Health Science Center.

"When I was a science teacher, I saw a disconnection with the kids in science class and what was actually taking place in the research science community," Dr. Reeves said.

That disconnection motivated Dr. Reeves to find a way to not only show high school students that science can be a fun, exciting field of study, but also to get students at the Health Science Center involved in generating that excitement in younger students.

"We have graduate students who are not much older than these high school students, and a lot of the SCORE fellows are minority as well," Dr. Reeves said. "They serve as mentors and role models to show these kids, 'Hey, here's someone who looks a lot like me. This could be something I can do, too.'"

He said the program includes school-year-end surveys that measure the students' attitude toward science, and they show a positive trend in changing their attitudes from thinking of science as a "nerdy" career choice to seeing it as something fun, exciting and within their ability.

Dr. Reeves said high school students are not the only ones to benefit from the SCORE program. The graduate students involved also gain much-needed experience.

"The graduate students who go into the programs first go into it not knowing a lot about what they're getting into," he said. "We have, almost unanimously across the board, seen how our students enjoy the program and how working with the high school students helps our graduate students' careers. Our students learn to communicate better, to manage time better and to use better people skills."

"Take a campus like ours, without undergrad students," he said. "This is one of the few opportunities our students have to interact as the teacher themselves. I think it better prepares our students for when they leave — it's a win-win situation all the way around."

Dr. Gonzales, a mentor himself, said he had student mentors during his work as a McNair student.

"I was lucky enough to have several student mentors," he said. "It's good to see someone else go through the process and be successful. I just felt like I should do that for those behind me who just started out."

Ultimately Dr. Gonzales said the benefit of the outreach programs is adding new and varied points of view to the health care and biomedical sciences fields.

The Health Science Center offers several programs for students of all ages that encourage them to study and work in scientific and health-related fields.

Faculty-mentored summer research internships are offered to college juniors intending to pursue doctoral degrees.

"It gets diversity in the mix," he said. "If you get more people of different backgrounds involved, you get more ideas cooking. Then there are all these new ideas, and breakthroughs will come because they see things from a different perspective. One of these kids could come up with a cure for fibromyalgia, and they probably, right now, have no idea they have that interest."

Dr. Gonzales added that the benefits of luring more minority students into science and health fields could possibly reach further than the immediate future, too.

"There's just so much out there for science," Dr. Gonzales said. "The more people we get involved, the better off we are, and it changes future generations as well."

Technology Transfer

The second year of its existence has been a busy one for the Office of Technology Transfer and Commercialization, formerly known as the Office of Technology and Alliance Development.

Dr. McClain oversees the Office of Technology Transfer and Commercialization.

Led by Robert McClain, PhD, the office continues to work hand-in-hand with TECH Fort Worth, a local business incubator that facilitates the transfer of technological research to the business sector to build a foundation for new industry in Fort Worth. As the lead academic research and tech transfer partner, the office makes new, small and established businesses aware of the technologies being developed and researched on campus. The office also helps faculty, staff and students identify inventions that may arise from their research, determines when it is appropriate to seek intellectual property protection, and manages the Health Science Center's process for doing so.

"My office facilitates the development and communication of technologies that are developed by faculty members and researchers at this institution," Dr. McClain said. "The institution has an obligation to transfer that knowledge and develop that discovery to benefit society.

"There is a process to do that," he said. "Going through that process is difficult, and sometimes it's characterized as having a valley of death, where inventions get stuck before they go out in the marketplace. My office exists to identify technology that might have some benefit to society, then drive those out into the economic engine. We file patents or enhance the invention's value by identifying partners who might be interested in driving this technology out."

Dr. McClain said once an invention is identified as having a marketable potential, his office works with TECH Fort Worth to identify businesses and investors who could help fund the development of the idea into a tool ready to be sold.

The company then can apply for federal funding, which TECH Fort Worth will help them do, or seek financial support in the community through investors and entrepreneurs. Once funding is secured, the company works with Health Science Center researchers to bring the technology to the marketplace.

The Office of Technology Transfer and Commercialization keeps in close touch with researchers on campus to stay abreast of new developments and discoveries. Although a new addition to the Health Science Center, this office has already been instrumental in fostering the necessary groundwork for furthering technology and research unique to the Health Science Center, as well as establishing technologies originated at the Health Science Center as profitable ventures for local industries and businesses.

For example, Andras Lacko, PhD, professor of molecular biology and immunology, is one of the researchers who works with Dr. McClain's office. Dr. Lacko is developing technology that will aid the delivery of chemotherapy to specific sites in the body, which in the past has been difficult to do.

The new technology would encapsulate non-water-soluble drugs in high-density lipoproteins to move the drug through a cancer patient's body to the specific site where the drug is needed to be effective.

Drs. Lacko and McConathy believe, "We are given the means through this program and Dr. McClain to interface with and gain support from industry leaders."

Dr. Lacko and Walter McConathy, PhD, associate professor in the Health Science Center's internal medicine department, are working with OMM Scientific to develop this research into a workable way to help fight cancer.

"Basically, we were both doing work with high density lipoproteins for about 25 years," Dr. Lacko said. "About eight years ago, we decided to switch gears and make it workable in the area of cancer chemotherapy. We wanted to come up with an effective and practical system that could actually proceed to the manufacturer.

"I believe we have now shown that this is practical," he said. "Since we started working, we've been able to show that our preparation is effective. We are now beginning to work with animals to take it to the next level. Ultimately, we hope this can be a very effective mechanism for chemotherapy."

Dr. Lacko said his work with Dr. McClain has helped move the research from his laboratory to the marketplace.

"He has helped us to negotiate with a number of representatives from industry," Dr. Lacko said. "We are working with a company in Dallas, which has been the first opportunity we were offered to do this. Dr. McClain provided us the opportunity to interface with industry and let them know what we're doing and to get someone to support this."

Another example of such technologies is a small molecule therapeutic for the dry form of age-related macular degeneration. AMD is an eye disease that can result in blindness. Technology being developed by James Simpkins, PhD, chair and professor of pharmacology and neuroscience and director of the Health Science Center's Institute for Aging and Alzheimer's Disease Research, and Laszlo Prokai, PhD, Welch Professor of molecular biology and immunology, could stop the disease from killing cells in the retina.

Eyesight Therapeutics, a California start-up company, has applied for a Texas Emerging Technology Fund grant to support the development of this therapy, and, if approved, will relocate to Fort Worth to complete this mission.

In other cases, the office can partner to bring research onto the Health Science Center campus. For instance, the Health Science Center and TECH Fort Worth recently signed their first tenant as a result of their joint efforts to bring university researchers and businesses together to advance technology in Fort Worth.

CorInnova, Inc. is an early stage medical device company that is developing and commercializing heart assist technologies that lead to heart recovery rather than heart replacement. The company has leased a lab and office at the Center for BioHealth on the Health Science Center campus and has signed a client services agreement with TECH Fort Worth. TECH Fort Worth will provide business mentoring, consulting and assistance in obtaining funding to help CorInnova bring their technology to market. In addition to space, the Health Science Center will provide other services, such as access to research databases, contract and grant management advice, and other services normally available only to university researchers.

New Faces

RONG MA

Advancing the understanding of basic kidney function

Diseases of the kidneys plague an estimated 4.5 percent of American adults over 20, according to research published in the *American Journal of Kidney Disease*. More than 300,000 Americans currently receive dialysis treatment, according to the National Institute of Diabetes and Digestive and Kidney Diseases.

Yet scientists still lack a basic understanding of how the kidneys function on the cellular level, depriving them of information that could generate more refined treatments. This gap in knowledge prompted Rong Ma, MD, PhD, assistant professor of integrative physiology, to study kidney function in healthy cells.

"My research provides information for the better understanding of the normal function of the kidney, increasing the potential for developing therapeutic strategies for new drugs or cures," Dr. Ma said.

Dr. Ma, who joined the Graduate School of Biomedical Sciences in August 2004, focuses his research on the function of ion channels in kidney cells. Ion channels are proteins within cell walls that regulate the movement of charged molecules (ions) in and out of the cell. Dr. Ma investigates how both healthy and unhealthy kidney cells regulate the intake of molecules such as sodium, potassium and calcium.

Dr. Ma, a native of the People's Republic of China, received his medical degree from Anhui Medical University in Anhui Province, China, and his doctorate degree from the University of Nebraska. Prior to joining the Health Science Center, he taught at the University of Oklahoma Health Science Center. He has won a number of research awards, including the Lazaro J. Mandel Young Investigator Award from the American Physiological Society and the Research Recognition Award from the American Physiological Society Renal Section, both in 2005.

Glenn Dillon, PhD, associate vice president for research and professor of pharmacology and neuroscience, anticipates that Dr. Ma's research will drive the understanding of kidney function in the next decade. "I think he's going to be one of the scientists really pushing the field," Dr. Dillon said. "Science will follow what he's doing."

Applying powerful technology to the study of proteins

At the conclusion of the Human Genome Project, scientists took a hard look at the next big challenge: proteomics.

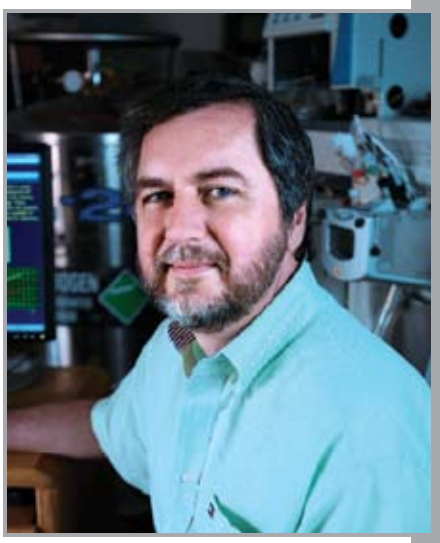
"Everyone concluded that after the genome, we have to address the proteome, the full set of proteins that are synthesized from the genes," said Laszlo Prokai, Ph.D., Robert A. Welch professor of molecular biology and immunology.

If DNA is the blueprint for life, proteins are the building blocks, responsible for cellular functions. The problem? The proteome is larger, more complex and more difficult to study than the human genome.

"Everybody agrees that proteomics cannot be done without innovation in technology, and a big part of that innovation comes through mass spectrometry," Dr. Prokai said.

New Faces

Laszlo Prokai



Dr. Prokai, who joined the Graduate School of Biomedical Sciences in August 2005, focuses on proteomics of the central nervous system and the brain. His current research includes the study of how toxins such as botulinum get into the central nervous system. He also continues work on the study of how the brain converts estrogen into a chemical that provides protection against neurodegenerative diseases.

Dr. Prokai's research relies on his expertise in mass spectrometry, an analytical technique used to discover the structure and properties of molecules. The Health Science Center provided his lab with a cutting-edge mass spectrometer, one of only three like it in the U.S. "When I saw the specifications for this instrument, I was just blown away," Dr. Prokai said. "You can pursue things with incredible accuracy and incredible sensitivity."

Dr. Prokai's interest in mass spectrometry goes back to his graduate work at the University of Veszprem in Hungary, where he received degrees in chemical engineering and radiochemistry. Deciding to focus on medicinal chemistry, he pursued post-doctoral research at the University of Florida. He continued there as a faculty member, rising to the position of professor of medicinal chemistry.

Harlan Jones

Uncovering the stress – illness relationship

Everyone knows stress can make you sick. What is not known is why.

Harlan Jones, PhD, assistant professor of molecular biology and immunology, is determined to find the answer. "When the body is under stress, it's hard for the immune system to function, but the mechanisms behind that are still unclear," said Dr. Jones, who joined the Graduate School of Biomedical Sciences in April 2005.

Dr. Jones studies how stress affects chronic diseases including asthma and cardiovascular disease as well as cancer. A current project looks at stress and disease in minority populations. Stress levels are high in minority populations struggling with unemployment, poor quality housing and other social inequalities.

Dr. Jones' appointment marks his return to the campus; he received his doctorate in microbiology at the Health Science Center in 2001. He earned his bachelor's and master's degrees at Louisiana State University. After graduating from the Health Science Center, he studied for two years at the Emory University School of Medicine as a postdoctoral fellow.

As a young researcher, Dr. Jones brings long-term potential to the Health Science Center, said Jerry Simecka, PhD, chair of microbiology and immunology, who served as Dr. Jones' major professor when he was a student.

In addition, as an African American, Dr. Jones serves as a role model for minority students. "Within a week or so of coming here, almost every minority graduate student had visited him at least once," Dr. Simecka said. "Having faculty who are minority role models benefits all of our students."

Investigating the details of bacterial infection

Most Americans today have little fear of bacterial infections. Diseases such as diphtheria and typhoid are unheard of in the developed world, and common bacteria-caused illnesses such as strep throat are quickly cured with antibiotics.

Yet in developing countries, infectious diseases account for one in two deaths, according to the World Health Organization. The rise of drug-resistant strains of bacteria makes these diseases harder to treat.

To confront this problem, scientists need to better understand how the immune system responds to bacterial infections. Rance Berg, PhD, assistant professor of molecular biology and immunology, intends to do that.

"We have simple questions. What types of cells get infected? How does the immune system get activated and respond?" said Dr. Berg, who joined the Graduate School of Biomedical Sciences in July 2005. "The immune system is exceedingly complex, and the bacteria and pathogens are smart. There's so much to know."

Dr. Berg investigates intercellular bacteria, i.e. bacteria that spend the majority of their lives within cells. He focuses on the bacterium *listeria*, which has the advantages of being easy to work with and only being a risk for humans who are immuno-suppressed or pregnant. Dr Berg's goal is to uncover information useful in designing future vaccines and treating patients whose immune systems are not controlling infection.

Dr. Berg received his bachelor's degree at DePaul University and his doctorate from the University of Colorado Health Sciences Center. Prior to joining the Health Science Center, he served as a post-doctoral fellow at the University of Texas Southwestern Medical Center in Dallas.

Dr. Berg brings "new approaches and new ideas of how to do certain aspects of research," said Jerry Simecka, PhD, chair and professor of microbiology and immunology. Dr. Simecka said Dr. Berg's interest will benefit the entire school. "I think he'll play an important role not only in his own research but in others' as well," he said.

Using fluorescence to diagnose diseases and keep goldfish happy

Ignacy Gryczynski, PhD, professor of cell biology and genetics, and Zygmunt "Karol" Gryczynski, PhD, professor of molecular biology and immunology, who joined the Graduate School of Biomedical Sciences in January 2006, both with joint appointments in the departments of cell biology and genetics and molecular biology and immunology, specialize in projects on the edge. Compliance monitoring for tuberculosis patients, credit card fraud protection, biohazard detection — all are potential applications for the Gryczynskis' research focus: fluorescence spectroscopy.

Dr. Ignacy Gryczynski, the elder of the brothers, began work in fluorescence spectroscopy while receiving master and doctoral degrees in physics from the University of Gdansk in Poland. Dr. Karol Gryczynski followed his brother to the same program, receiving the same degrees. "He followed in my footsteps," Ignacy claimed. "I had no choice," Karol retorted.

The two eventually arrived at the University of Maryland at the Baltimore School of Medicine, where they worked together for eight years.

"This combination, we realized, was very good because together we are much stronger than separated," Dr. Ignacy Gryczynski said. He prefers to focus on designing experiments and managing the lab, while Dr. Karol Gryczynski travels to conferences and meets with collaborators. Ignacy said it's because Karol is the better speaker, but Karol said, "He likes doing lab work. Everything he doesn't like comes to me. That's how it goes."

The Gryczynskis plan to use fluorescence spectroscopy in the field of proteomics, where it could be critical in understanding conformational changes in proteins — that is, minute shifts in compound shape and structure. Conformational changes are associated with the sending and receiving of signals from cells, and distortions in these signals can lead to a variety of diseases such as Alzheimer's.

Their ideas don't stop there. The Gryczynskis have suggested applications for fluorescence spectroscopy ranging from detecting bioweapons to monitoring oxygen levels in fish aquariums.

The brothers have ambitious plans. "Now we have a beautiful lab, but I believe this will become a nationally and internationally recognized center for fluorescence spectroscopy," Dr. Ignacy Gryczynski said.

"The Gryczynskis can really push us forward," said Glenn Dillon, PhD, associate vice president for research and professor of pharmacology and neuroscience. "They can do anything with fluorescence. They've developed technology to do imaging that hasn't been done before. They have the potential to really impact a lot of the fundamental ways we do diagnostics and science."

Exposing the connection between economics and health

Ask people about the single most significant factor in predicting their lifespan, and most would answer diet, or exercise, or whether or not you smoke.

No, no and no, said Harvey Brenner, PhD, professor and chair of social and behavioral sciences at the School of Public Health. According to Dr. Brenner, the most important factor is your country's Gross Domestic Product.

"GDP is the single most important factor, but there are several," Dr. Brenner said. One additional factor is the size of a nation's shadow economy, which includes illegal commerce and cash transactions. Another is income inequality, which correlates with both accident rates and homicides.

A positive factor — and the second most important — is self-employment. "It's going to be service industries — accountants, architects, doctors, retail — which are the very safest places to work," Dr. Brenner said. Workers

aren't exposed to the occupational and environmental hazards found in industry or agriculture, and they have a high level of personal autonomy. Working for others limits control of your own life and work, "and that brings a certain level of frustration and disappointment, which are bad things for health," Dr. Brenner said.

Dr. Brenner, who joined the Health Science Center in July 2005, earned his undergraduate degree in economics from City University of New York and his master's and doctorate degrees in sociology from Yale University. He continues to hold appointments at Johns Hopkins University and Berlin University of Technology; he also taught at Yale and Harvard universities.

Dr. Brenner served as a consultant for the United Nations Social Defense Research Institute, the World Health Organization, the Joint Economic Committee of the U.S. Congress and the European Union, among others.

Dr. Brenner said the "fresh, expansive thinking" at the Health Science Center attracted him to the program. "The commitment by the state and institutions to develop national class, if not world class, programs meant a great deal to me," he said. Further, being department chair "represents a chance to form some of my own vision of the scientific future."

Researching the real effectiveness of medications

If your doctor discovers you have high cholesterol, he or she might write a prescription for one of the statin drugs.

You'll probably end up with the drug that your health insurance prefers, the medication on their formulary. But is that drug the best? Does it work as well as others? Or is it from the company most willing to make a deal?

Jeffery Talbert, PhD, associate professor and chair of health management and policy at the School of Public Health, is looking for the answer. "The drugs are priced differently, but do they work the same? If they work the same, why not pick the cheapest?" said Dr. Talbert, who joined the Health Science Center in July 2005.

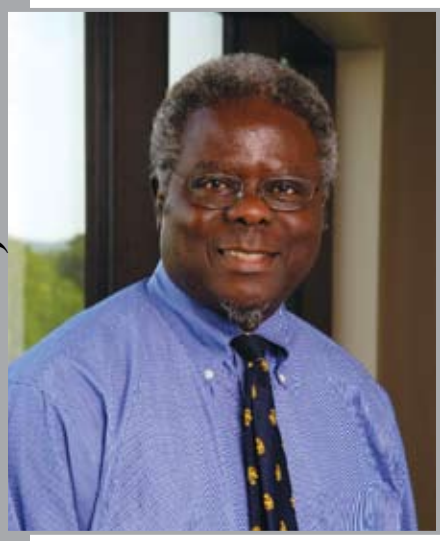
In addition to this research, he's also planning a new project looking at the impact of undocumented workers on the Texas hospital system. "All the care of illegal immigrants goes uncompensated," Dr. Talbert said. "We're trying to determine the financial cost to the hospital and the state for those individuals. Once we have the numbers, we can do a financial calculation to determine whether or not it would save money if we covered these people with Medicare-like insurance."

Dr. Talbert earned a bachelor of science, a master of arts and a doctorate in political science from Texas A&M University. Over a 10-year career at the University of Kentucky, Dr. Talbert was an associate professor at the Martin

School of Public Policy, and he served as director of graduate studies for the master of public administration program, the master of public policy program, the master of health administration program, and the doctoral program.

Dr. Talbert's expertise in administration and curriculum development has already had a significant impact in the School of Public Health, said Fernando Treviño, PhD, MPH, dean of the school. "He is helping us develop a master of health administration program as well as a doctoral program," Dr. Treviño said. "We were very fortunate to bring him here."

ERIC JOHNSON



Studying the animal virus - human illness connection

The bird flu virus continues to get headlines — and no wonder. In the rare cases where the virus has moved from birds to human, more than half of those infected died.

But the newspapers might be overlooking a more insidious problem. Could another bird-borne virus be killing people everyday?

It's a question asked by Eric Johnson, PhD, MD, MPH, DTPH, professor and chair of the epidemiology and environmental and occupational health departments in the School of Public Health.

"There are known cancer-causing viruses in chickens," said Dr. Johnson, who joined the Health Science Center in September 2005. While present in raw chickens and eggs, the viruses are destroyed when cooked.

Dr. Johnson decided to determine the risks to humans by conducting long-term mortality studies of meatpacking and slaughterhouse workers. His results so far are disturbing. "We're finding definite excess risk of cancer," Dr. Johnson said. "We've also done lab studies that have found that humans carry antibodies to these viruses. So, yes, humans can be infected."

Dr. Johnson's current research is part of a long career investigating environmental and occupational health hazards, including dioxins and benzene, as well as animal viruses.

Dr. Johnson, a native of Sierra Leone, studied medicine at the University of Newcastle Upon Tyne in Newcastle, England, and earned a diploma in tropical public health from the London School of Hygiene and Tropical Medicine. After working in public health in Africa, he earned a master of public health degree from Harvard University and a doctorate in epidemiology from Johns Hopkins University.

Prior to joining the Health Science Center, Dr. Johnson served as associate professor at the Tulane University School of Public Health. His plans to come to Texas were accelerated by Hurricane Katrina; Dr. Johnson arrived in Fort Worth three months earlier than he had anticipated because of the evacuation of New Orleans.

Dr. Johnson has unique strengths as "a scientist who works in a lab as well as in a clinical setting," said Fernando Treviño, PhD, MPH, dean of the School of Public Health. "He is a very eminent scientist. We're looking to him to provide leadership and guide the faculty in both departments."

Research 2006

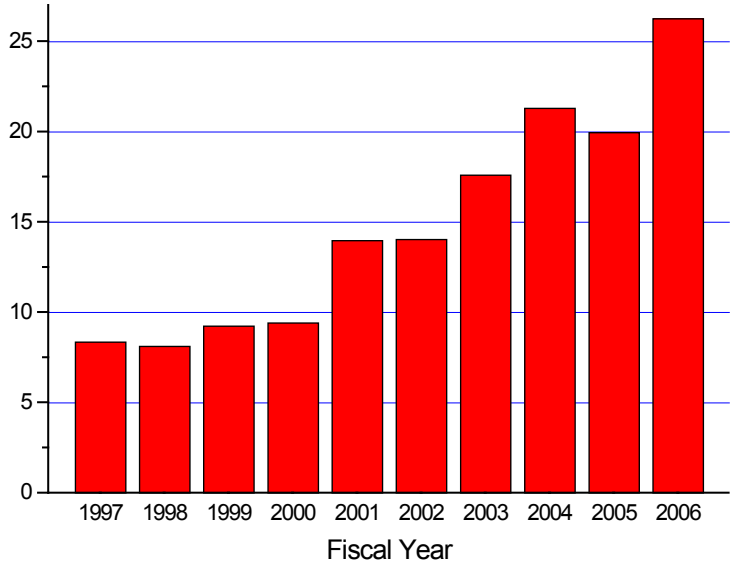
Research awards and applications at the Health Science Center continue to grow, with current extramural research awards topping $26 million per year and an aggregate total of $60 million. This increase in research funding has outpaced the other health science centers in Texas, in spite of a decrease in NIH federal awards experienced nationally. Our faculty have been busy writing grants, with an increase in total grants this past year topping $150 million. This activity should translate into increased funding for next year.

The majority of our funding is derived from the federal government, with NIH representing more than 60 percent of the total.

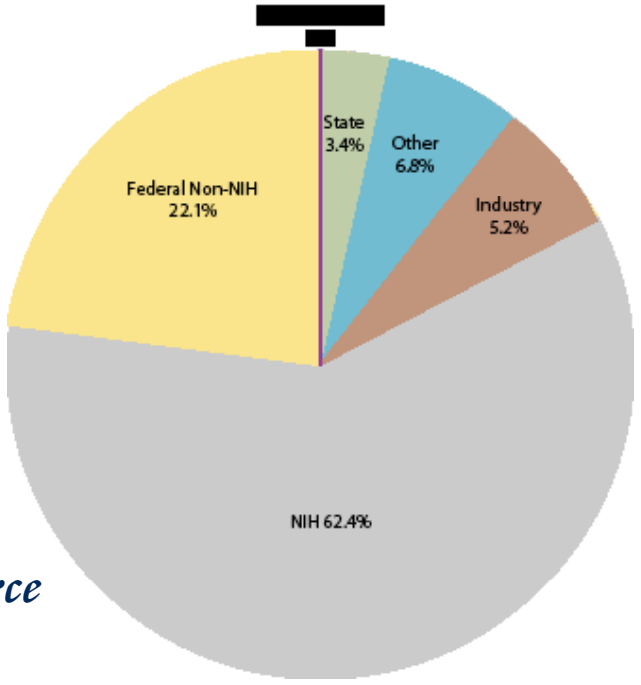
In addition, we are fortunate to have a number of faculty who have obtained grants totaling more than $1 million each. This "million dollar club" lists only those faculty with currently funded grants and includes the number of their active grants that each exceed $1 million. This list will increase as we expand our research efforts and numbers of faculty.

Research continues to grow at the University of North Texas Health Science Center, where our faculty contribute to the understanding of disease mechanisms and investigate ways in which we can lead healthier lives.

Grants Awarded



Funding By Source



Million Dollar Club *

Alakananda Basu – Cancer • Christopher deFiebre – Drug Abuse • Ladislav Dory – Cardiovascular • Fred Downey – Cardiovascular • Art Eisenberg – Human Identification • Michael Forster (3X) – Aging • Stephen Grant – Cardiovascular • Eunsun Jung – Drug Abuse • Robert Kaman (2X) – Outreach • Peter Koulen (2X) – Visual Science & Aging • Laszlo Prokai – Alzheimer's • Peter Raven – Cardivascular • Rustin Reeves – Outreach • John Schetz – Mental Health/ Environmental • Wolfram Siede – Cancer • Jerry Simecka (3X) – Immunology • James Simpkins (9X) – Alzheimer's • Meharvan Singh – Women's Health • Michael Smith – Sleep Apnea • Scott Stoll – Musculoskeletal • Craig Spellman – Diabetes • Jamboor Vishwanatha – Health Equity/ Cancer • Stephen Weis (2X) – Tuberculosis • Thomas Yorio (3X) – Glaucoma

** Faculty with grants of a million dollars each.*

Commitment to Research

Dr. Scott Ransom

Research will continue as a top priority at the University of North Texas Health Science Center as the new president, Scott Ransom, DO, MBA, MPH, takes the reins.

It may seem atypical for the leader of the Health Science Center to continue teaching, clinical care and research in addition to his other duties, but Dr. Ransom intends to include all as part of his presidency.

Dr. Ransom, who was previously executive director of the program for healthcare improvement and leadership development and a professor of obstetrics, gynecology, health management and policy at the University of Michigan-Ann Arbor, has a strong commitment to research. "I believe clinical practice and research keep me connected to the faculty and focused on improving the health and welfare of the individuals we serve," Dr. Ransom said. "I have a deep and broad interest in research and will continue to pursue funded research activities."

Dr. Ransom intends to continue research projects he started at the University of Michigan prior to being chosen as the Health Science Center's sixth president.

"One of the NIH (National Institutes of Health) grants I brought with me from the University of Michigan is focused on improving African American pregnancy outcomes," he said. "I have a desire to reduce infant mortality, which is the focus of this large interdisciplinary NIH Roadmap grant."

The research examines the occurrence of low birth weight and pre-term births in minority populations. Representatives of several disciplines are involved in the research, but in a revolutionary way. "There is research going on all the time called interdisciplinary, but it's actually multidisciplinary," Dr. Ransom explained. "It's when scientists work together, but they don't really work together — you have a doctor over here doing his thing and a nurse doing her thing over here.

"True interdisciplinary work is really hard and requires a lot of time and effort. We have made sure everyone on this project has an understanding of each other so we could truly work together — so our geneticists could understand our engineers, for example."

Working in this way, Dr. Ransom hopes to widen the scope of the study to include participants in Fort Worth as well as add Hispanic women to the white and African American women currently in the study.

Research initiatives have always been an integral part of the UNT Health Science Center legacy, and Dr. Ransom will carry the torch well, continuing to seek increased funding opportunities and further solve issues surrounding public health.

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